

AMENDMENTIn the Specification:

Please replace the paragraph that begins at page 8, line 2, and ends at page 8, line 13, with the following replacement paragraph:

A1
A number of program modules may be stored on the hard disk, magnetic disk 29, optical disk 31, ROM 24 or RAM 25, including an operating system 35, one or more application programs 36, other program modules 37, program data 38, a transaction recorder 71, and a transaction replayer 72. A user may enter commands and information into the personal computer 20 through input devices such as a keyboard 40 and pointing device 42. Other input devices (not shown) may include a microphone, joystick, game pad, satellite disk, scanner or the like. These and other input devices are often connected to the processing unit 21 through a serial port interface 46 that is coupled to the system bus, but may be connected by other interfaces, such as a parallel port, game port, universal serial bus (USB), or a 1394 high-speed serial port. As another example, host adapter 55 may be connected to system bus 23, and host adapter 55 may, in turn, be connected to storage device 62 via Small Computer System Interface (SCSI) bus 56. A monitor 47 or other type of display device is also connected to the system bus 23 via an interface, such as a video adapter 48. In addition to the monitor 47, personal computers typically include other peripheral output devices (not shown), such as speakers and printers.

Please replace the paragraph that begins at page 12, line 6, and ends at page 12, line 19, with the following replacement paragraph:

A transaction recorder in accordance with the present inventions is like a proxy server that serves as a bridge between web browser 180 and the Internet, relaying communications between the browser and the Internet while recording the communications. Figure 5 shows a proxy server 502 in use with web browser 180. Proxy server 502 may be a dedicated machine serving as a firewall or an ISP, or it may be a transaction recorder running on the same computer 20 as web browser 180. Web browser 180 is configured to direct all outgoing communications destined for the Internet 160, such as requests for web pages, to proxy server 502 through its proxy server interface 501. Web browser 180 is also configured to receive all incoming communications, such as retrieved web pages, from proxy server 502 through proxy server interface 501. When web browser 180 opens a connection to proxy server 502, the proxy server opens a corresponding connection to server 10a, which is part of the Internet 160. When web browser 180 sends a request for a web page to proxy server 502, the proxy server forwards the request to the Internet 160 via server 10a. When web browser 180 closes the connection to proxy server 502, the proxy server closes the corresponding connection to server 10a.

Please replace the paragraph that begins at page 12, line 20, and ends at page 13, line 11, with the following replacement paragraph:

In order to permit a user to configure web browser 180 for use with a

proxy server, such as the disclosed recorder, web browser 180 provides a series of dialog boxes through which a user may instruct web browser 180 to use a proxy server and may provide information identifying the location of the proxy server. Web browser 180 has an Internet options dialog box 600 (see Figure 6), whereby a user may configure various aspects of web browser 180. A user configures web browser 180 through dialog box 600 by using an input device, such as keyboard 40 or mouse 42. One section of dialog box 600 is a connections section, which the user can view by using mouse 42 to click on tab 601 in the example shown. The connections section permits the user to configure various features of web browser 180 pertaining to the connection between web browser 180 and the Internet, such as the dial-up settings 603, and local area network settings 604. The connections section includes a button 602 marked; by using mouse 42 to click on button 602, the user is able to configure the local area network settings of web browser 180, including the proxy server settings.

Please replace the paragraph that begins at page 16, line 16, and ends at page 17, line 5, with the following replacement paragraph:

Browser 180 sends a communication destined for the Internet 160a, such as a request for a web page located at web site 803, to recorder object 71 over connection 802 through proxy server interface 801. Recorder object 71 receives the communication through client interface 808. Recorder object 71 relays the communication to the Internet 160a over connection 806 through Internet interface 809. While relaying the communication from web browser 180 to the

Internet, recorder object 71 creates a record 804 of the communication. The record includes the URL of the web page requested by browser 180, and may also include additional information such as: the duration of a communication, the sizes of packets 807 used in communications, the DNS resolution time of the URL, and the time between various communication events. As described more fully below, this information may be used in a transaction replayer to replicate some aspects of the transaction.

Please replace the paragraph that begins at page 17, line 6, and ends at page 17, line 10, with the following replacement paragraph:

Recorder object 71 also receives communications from the Internet 160a destined for browser 180, such as the content of a web page requested. Recorder object 71 relays these communications to browser 160a, and may, optionally, record information about these communications, such as the content of the communication, the duration of the communication, and the time since the most recent communication from client 180 to the Internet.

Please replace the paragraph that begins at page 17, line 18, and ends at page 18, line 20, with the following replacement paragraph:

Recorder object 71 may also be associated with an analysis module 805, which is a software module that may be a component of recorder object 71. Analysis module 805 interprets communications between browser 180 and the Internet, and may modify the record to reflect its interpretation. One function of analysis module 805 is to draw inferences about the context of some

communications from web browser 180, in order to permit a transaction replayer (not shown) to simulate a user transaction more accurately. For example, one communication from browser 180 may be a request to retrieve a web page 410a located at a specified URL; web page 410a is depicted in Figure 9. Web page 410a may contain hyperlinks 411a-411c to other web pages identified by their URLs 401a-401c. The user operating browser 180 may issue a command to follow one of the hyperlinks, such as hyperlink 411b; this command will be observed and recorded by recorder object 71 (shown in Figure 8) only as a request for a the web page located at URL 401b. Analysis module 805 compares the URL 401b with the URLs referenced in the hyperlinks 411a-411c in web page 410a. Because URL 401b appears among hyperlinks 411a-411c, analysis module 805 concludes that browser 180 requested the web page at URL 401b as a result of following hyperlink 411b on web page 410a. This information can be entered in the record by recording the request for the web page at URL 401b as the following of the second hyperlink on web page 410a; alternatively, the record may initially contain the URL referenced in the followed hyperlink and can be modified later by analysis module 805 to reflect the following of the second hyperlink on web page 410a. The position of a hyperlink among all hyperlinks on a web page is defined as the hyperlink's ordinal position; for example, in web page 410a, the ordinal position of hyperlink 411a is first, of 411b is second, etc. Recording the request for a web page as the following of a hyperlink permits a transaction replayer making use of the record to simulate more accurately a user

Internet session, in which a user follows hyperlinks on web pages rather than merely requesting a series of unrelated web pages.

Please replace the paragraph that begins at page 20, line 13, and ends at page 21, line 2, with the following replacement paragraph:

Figure 11 depicts the use of a transaction replayer. Transaction replayer 1101 is an Internet client connected to the Internet 160 through connection 1102. Transaction replayer makes use of the record 804 created by the process depicted in Fig. 10, to replay a recorded transaction. For example, record 804 contains URLs requested during a browser session; transaction replayer 1101 can issue requests for those same URLs. Where analysis module 805 has been used to infer which URL requests were made as the result of a user following hyperlinks, and the ordinal position of the followed hyperlink has been recorded, transaction player 1101 can carry out an instruction to follow the n-th hyperlink by examining the previous web page received, determining the URL referenced by the n-th hyperlink, and requesting the web page located at that URL, where “n-th” denotes the ordinal position of the hyperlink to be followed.

Please replace the paragraph that begins at page 21, line 14, and ends at page 22, line 7, with the following replacement paragraph:

Figure 12 is a flowchart showing the processes by which the replayer simulates a user transaction by using the record 804 created by the transaction recorder. The replayer begins its main loop by starting at step 1201. At step 1202, the replayer makes a connection to an Internet server and initializes a

pointer to point to the first item in record 804. The items in record 804 include URLs of web pages to be requested, and instructions to follow hyperlinks on prior web pages. At step 1203, the replayer gets an item from record 804 by looking up the item that is currently being addressed by the pointer; at the start of the replayer session, the pointer addresses the first item. At step 1204, the replayer evaluates whether the item is a request for a specific URL. If the item is a request for a specific URL, then the replayer proceeds directly to step 1207 to process the URL; if the item is an instruction to follow a hyperlink rather than a specific URL, then the replayer looks up the hyperlink on the most recent web page (step 1206), which is stored in the log 1220 of the replayer session. Log 1220, which is created during the replayer session and contains historical information about the session, is discussed below. After determining the URL referenced in the hyperlink to be followed, the replayer proceeds to the processing routine, which begins at step 1207.

In the claims:

Please cancel claims 1-3, 5-6, 10-14, and 17-20, without prejudice or disclaimer of applicants' right to pursue the subject matter of the cancelled claims in an appropriate continuing application.